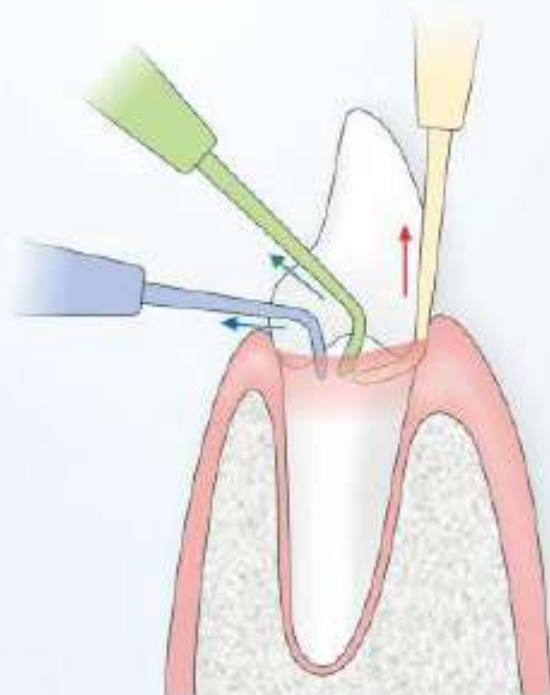




Textbook of **Periodontology** for Undergraduate Students

According to AAP 2018 Classification

Devinder Singh Kalsi
Parul Kalsi



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What are the anatomical landmarks at coronal and apical extents of attached gingiva?

What type of epithelium covers the attached gingiva?

What are the boundaries of attached gingiva?

Is an anatomical boundary present between attached gingiva and palatal mucosa?

ATTACHED GINGIVA

The attached gingiva is a **non-movable** part of gingiva. It is firmly bound to underlying cementum of the root and periosteum of the alveolar bone. It extends from base of the sulcus/free gingival groove to the mucogingival junction (*free gingival groove forms at the level of base of the sulcus on oral aspect of gingiva*) (Figs 2.2 and 2.8). Attached gingiva is covered by stratified squamous **keratinizing** epithelium (Fig. 2.12).

Boundaries of Attached Gingiva (Fig. 2.8)

- Free gingiva on the coronal side.
- Alveolar mucosa on the apical side.
- On the **palatal** side, **no** anatomical boundary exists between attached gingiva and palatal mucosa. Here attached gingiva gradually blends **unnoticeably** with the palatal mucosa (*which is similar to attached gingiva*).

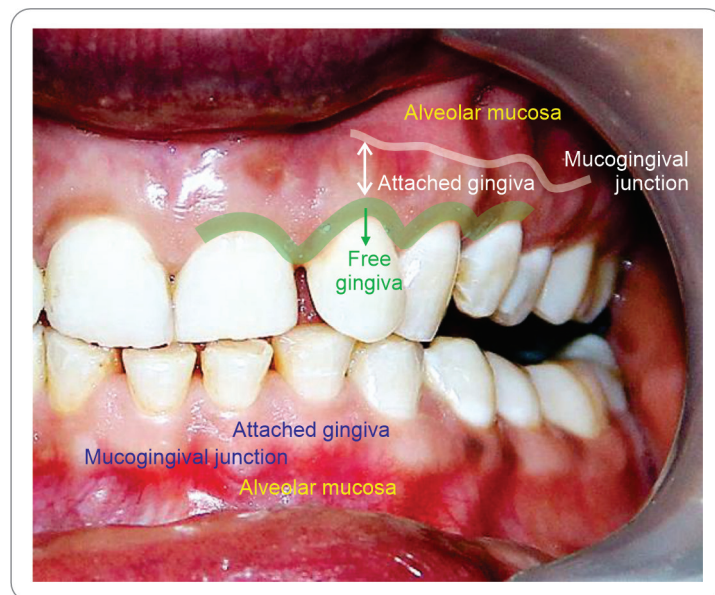


Fig. 2.8: Attached gingiva and its boundaries



CLINICAL UTILITY AND SHORT ANSWER

What is mucogingival junction?

What is alveolar mucosa?

- Alveolar mucosa covers the alveolar process (Figs 2.2 and 2.8).
- It is situated apical to attached gingiva and is separated from it by the mucogingival junction.
- Alveolar mucosa is not present on the palate.
- It is dark red in colour, movable and elastic.
- It is lined by non-keratinizing epithelium.



CLINICAL UTILITY AND SHORT ANSWER

Which areas of gingiva are keratinized (covered by keratinizing epithelium)?

1. Attached gingiva,
2. Interdental papilla's facial surface
3. Palatal mucosa (Figs 2.9 and 2.12).

What is the difference between attached gingiva and keratinized gingiva?

Is the width of attached gingiva same as that of keratinized gingiva?



CLINICAL UTILITY AND SHORT ANSWER

Is keratinized gingiva same as (equal to) attached gingiva?

No. Attached gingiva is only one constituent of keratinized gingiva. Both free and attached gingivae are keratinized, i.e. total width of keratinized gingiva is a sum of width of free gingiva and attached gingiva. Width of attached gingiva is therefore **lesser** than width of the keratinized gingiva (Fig. 2.9).

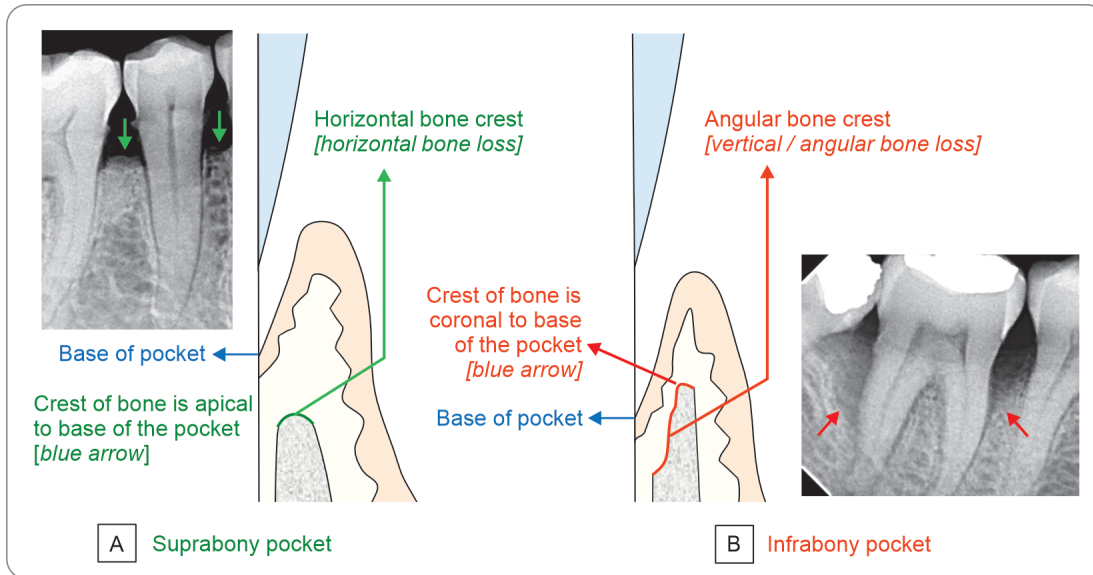


Fig. 10.6: Suprabony pocket (horizontal bone loss, green arrows) and infrabony pocket (vertical bone loss, red arrow).



CLINICAL UTILITY AND SHORT ANSWER

Differences between suprabony and infrabony pockets

Suprabony

1. Base of pocket is located coronal to crest of alveolar bone.
2. Lateral wall of pocket is made entirely of soft tissue (*gingiva*).
3. Crest of alveolar bone is horizontal, i.e. there is horizontal bone loss.
4. Transseptal fibers run horizontally over crest of resorbed interdental alveolar bone septum.
5. On facial and lingual/palatal surfaces PDL fibers follow their normal course apical to the base of the pocket.

Infrabony

1. Base of pocket is located apical to crest of alveolar bone.
2. Coronal part of lateral wall of the pocket is made of soft tissue (*gingiva*) while its apical part is made of partially resorbed alveolar bone crest that is covered by pocket epithelium.
3. Crest of the alveolar bone is angular i.e. there is angular or vertical bone loss.
4. Transseptal fibers run obliquely over crest of partially resorbed interdental alveolar bone septum.
5. On facial and lingual/palatal surfaces the PDL fibers follow an angular course over the angular bone crest apical to the base of the pocket.

Tooth Surface Wall of the Pocket

A pocket has *three* boundaries:

1. Tooth surface wall
2. Gingival wall
3. Floor made by junctional epithelium.

◀ What are the boundaries of a pocket?

The tooth side wall (*tooth surface*) of a periodontal pocket shows distinct zones from coronal to the apical end:

1. Tooth structure (*enamel/cementum/dentine or their combinations*)
2. Calculus
3. Attached plaque (*plaque deposited over calculus or tooth surface*)
4. Unattached plaque (*plaque suspended in the sulcus or pocket*)
5. Junctional epithelium
6. Zone showing partial destruction of connective tissue fibers and diseased connective tissue.
7. Zone of healthy connective tissue.

Area of the tooth covered by zones 4, 5, 6, and 7 is also called '*Plaque Free Zone*'.

◀ What is plaque free zone?

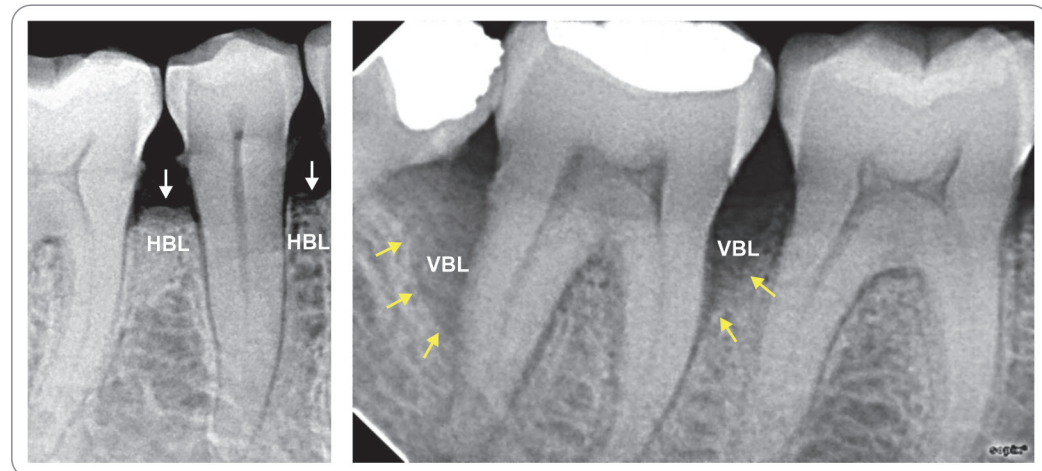


Fig. 10.14: Different sites in the same patient and around the same tooth will present different amounts of bone loss in periodontitis. This bone loss may either be horizontal (HBL, white arrows diag. A) or vertical (VBL, yellow arrows diag. B).

Can pus be expressed from all pockets in a case of periodontitis?

⚠️ ALERT!

Suppuration is demonstrable (*milking of a pocket*) only at approximately 5% of sites with periodontitis (Fig. 10.12).

Does periodontitis occur at all sites in the mouth?

⚠️ ALERT!

Periodontitis is site specific.

Periodontitis is a **site-specific disease**. It may be active at a particular site or sites whereas other sites in the mouth may be normal. It occurs at a site, in direct response to plaque accumulation and calculus deposition at that particular site only.

Classification of Periodontitis

According to the multi-dimensional staging and grading system of the 2018 classification, periodontitis can be classified as:

Staging of periodontitis classifies periodontitis based on which parameters?

Periodontitis is classified into how many stages in the 2018 classification?

Grading of periodontitis classifies periodontitis based on which parameters?

Periodontitis is classified into how many grades in the 2018 classification?

Periodontitis is classified into which two types based on extent of periodontitis?

If periodontitis is present only in relation to molars and incisors what is it called?

What is grade C periodontitis?

1. Based on **severity and complexity of management** (Fig.10.15)
 - i. **Stage I** (initial or mild periodontitis).
 - ii. **Stage II** (moderate periodontitis).
 - iii. **Stage III** (severe periodontitis with potential for additional tooth loss).
 - iv. **Stage IV** (severe periodontitis with potential for loss of dentition).
2. Based on **risk of rapid progression and anticipated treatment response** (Fig. 10.16)
 - i. **Grade A** (slowly progressing periodontitis; periodontal destruction is little and is relatable to amount of plaque deposits).
 - ii. **Grade B** (periodontitis with moderate rate of progression; periodontal destruction is moderate and relatable to amount of plaque deposits).
 - iii. **Grade C** (periodontitis with fast rate of progression).
3. Based on **extent**
 - i. **Localized** (30% or lesser number of teeth involved).
 - ii. **Generalized** (more than 30% teeth involved).
4. Based on distribution (area of involvement in the mouth).
 - i. **Molar-incisor distribution** (periodontitis restricted to molar and incisor region only; other teeth are uninvolved).

Grade C Periodontitis

Grade C periodontitis (2018 classification) is unique and totally different from grade A and B periodontitis in many aspects. However, it has **not** been found to be different enough for it to be classified as a separate disease entity in the 2018 classification. Due to its unique

Making Clinical Diagnosis of Gingivitis and Periodontitis using the 2018 Classification

The 2018 classification provides criteria for diagnosis of periodontal health, gingivitis and periodontitis. Main advantage of the 2018 classification is that it takes severity of periodontitis, complexity of treatment and patient's periodontal and overall oral rehabilitation needs into consideration for classifying periodontal disease. This helps in treating periodontal disease better. To do this, the 2018 classification has made big changes and introduced new terminology:

1. Chronic and aggressive periodontitis are **no longer** considered as separate diseases; they have been combined into a **single** disease entity called **periodontitis**.
2. Criteria and definitions have been given for gingival health, gingivitis and periodontitis at a particular site (*site level diagnosis*) and for the entire mouth (*case level diagnosis*).
3. Periodontium providing less than normal support to a tooth (*presence of CAL*) has been termed **reduced periodontium**. It can occur due to:
 - a. Periodontitis.
 - b. Other causes like tooth position (*causing apical placement of crest of bone and gingiva*) crown lengthening procedures done on that tooth, caries, etc.

- ◀ Are chronic and aggressive periodontitis considered separate or same disease entities in the 2018 classification?
- ◀ What is reduced periodontium?

DIAGNOSIS IS MADE AT TWO LEVELS (SITE LEVEL AND CASE LEVEL)

When using the 2018 classification, diagnosis is **first** made at individual sites around teeth. This is called **site level diagnosis**. Information from site level diagnosis is then used to make case diagnosis. This is called **case level diagnosis**. Steps in making diagnosis using 2018 classification are presented below:

- ◀ What is site level diagnosis?
- ◀ What is case level diagnosis?

STEP I: MAKING SITE LEVEL DIAGNOSIS

(To know whether there is gingival health, gingivitis or periodontitis at a particular site in the mouth)

2018 classification acknowledges the fact that, condition of gingiva at a particular site may be different from the overall diagnosis, e.g. gingiva may be healthy at some sites while the case may be that of gingivitis or periodontitis. Therefore, to make a case diagnosis, clinical gingival health or disease is **first** assessed at site level (*at individual sites in the entire mouth*) and then, information from all the sites is used to make a case level diagnosis. Steps in making a site level diagnosis are:

- ◀ Is site level diagnosis made before or after case level diagnosis?

Step Ia: Know if CAL is present at a particular site; this helps us know whether sites have intact or reduced periodontium

1. Intact Periodontium

Periodontium which has **never had periodontitis** and exhibits **no CAL** (*clinical attachment loss*) or **RBL** (*radiographic bone loss*) and **base of the sulcus is located on the enamel**, is called intact periodontium.

- ◀ What is intact periodontium?

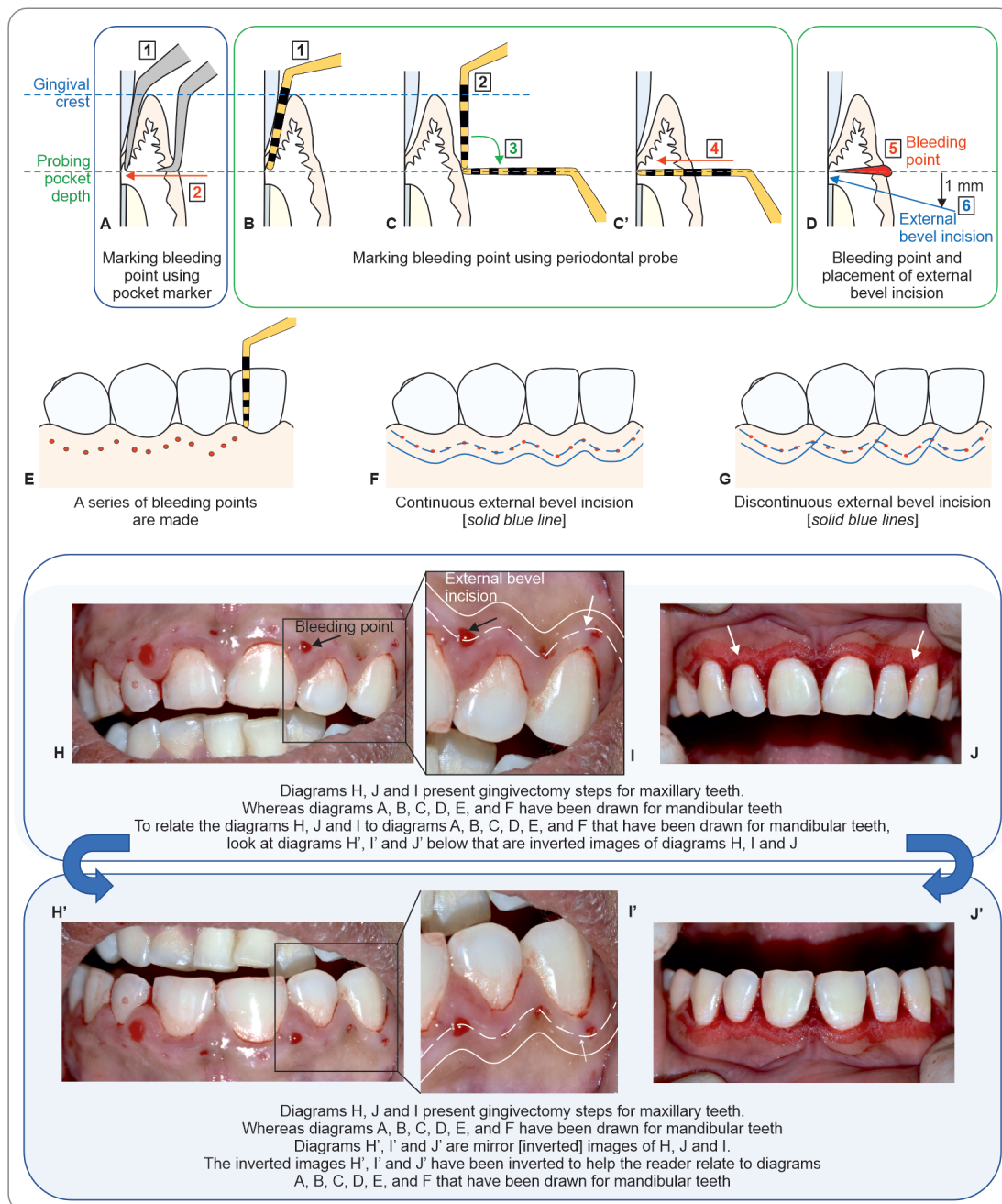


Fig. 17A.2: Marking bleeding points using a pocket marker and periodontal probe, placement of external bevel incision and beveled gingiva after completion of gingivectomy.

- It is also started from the distal surface of the posterior most tooth but is *ended* at the *distal surface of the next anterior tooth*.
 - The next incision is started at the point where the previous incision crosses the interdental papilla and it is ended at the distal surface of the next anterior tooth.
 - Such interrupted incisions are repeated across each tooth till the last tooth in the surgical field is reached (Fig. 17A.2, diag. G, solid blue line).
- c. Combination incision:** Continuous and discontinuous incisions are usually given in combination as per requirements and convenience of the clinician.
- External bevel incisions are made both on the buccal and lingual/palatal side and these two are connected by a distal incision across the distal surface of the last tooth.

◀ How is a discontinuous incision made?

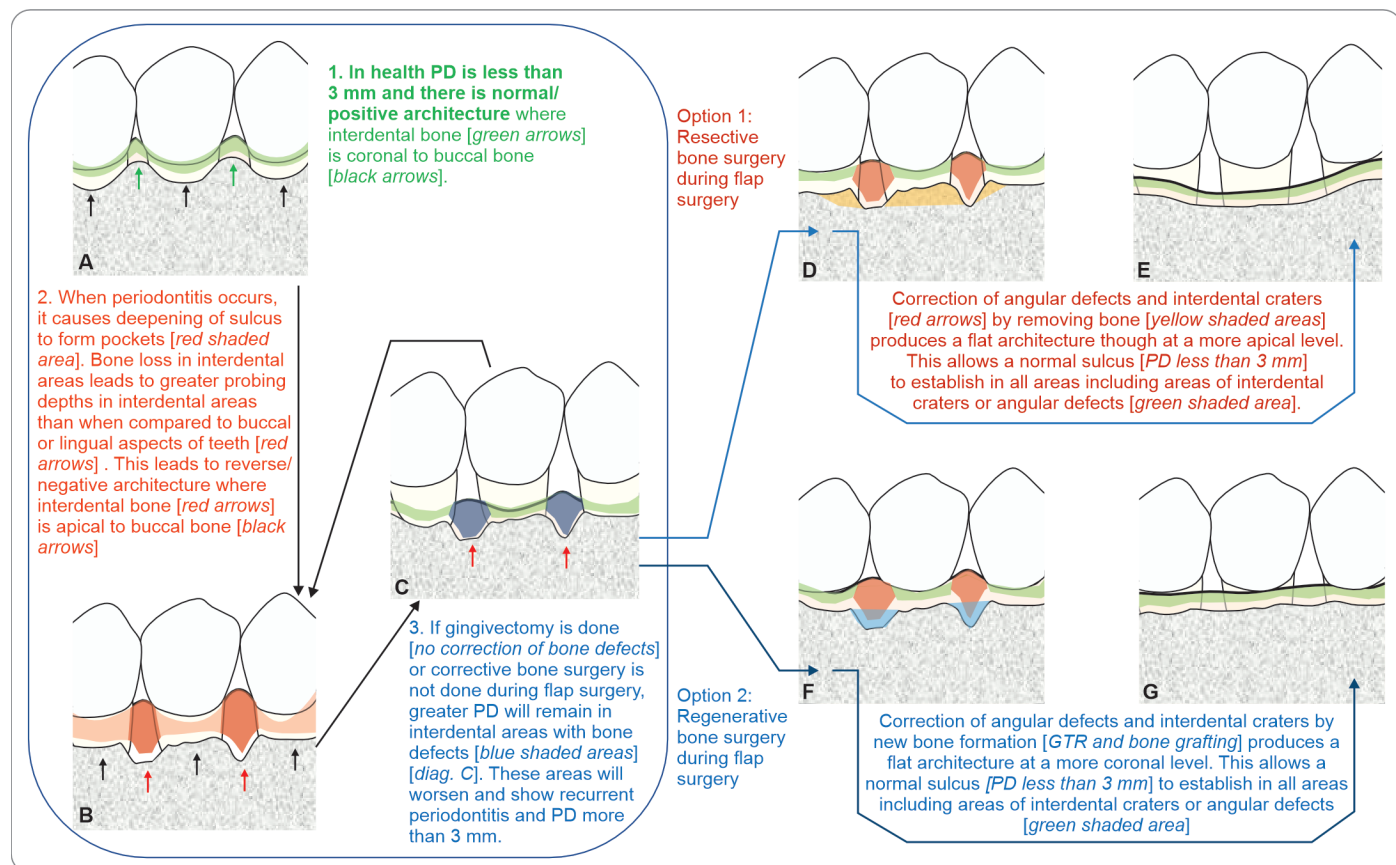


Fig. 18.4: Why and how interdental bone defects must be corrected

⚠️ ALERT!

Why more bone loss is seen in interdental areas?

More bone loss is seen in interdental bone as compared to buccal and lingual or palatal bone because:

1. Interdental areas are non-self-cleansing areas, i.e. are not cleaned properly by natural physical cleaning mechanisms like scrubbing action of tongue and food during mastication, etc. This leads to initiation and worsening of periodontitis in the interdental areas. On the other hand, buccal and lingual or palatal areas are cleaned very well by natural cleaning mechanisms.
2. Interdental bone septum is composed primarily of cancellous bone overlaid by a thin coat of cortical bone (*crestal lamina*). The crestal lamina (*superficial cortical bone layer*) being more calcified resorbs slowly in periodontitis, but after it gets totally resorbed, the underlying cancellous layer being less calcified (*hence softer*), resorbs at a much faster rate. On the other hand, the buccal and lingual/palatal bone plates are made mostly of cortical bone (*which is harder than the cancellous bone*). They therefore resorb at a slower rate than the interdental septum.

Why does interdental bone resorb faster?

⚠️ ALERT!

- Periodontitis with **less than 5 mm** PD (probing/pocket depth) (*critical probing depth*; see Chapter 17, 'Surgical Treatment of Gingivitis and Periodontitis', pages 292 and 293 and Fig. 17.2) and minor bone loss is usually treated with **SRP** (scaling and root planing) alone. However, if PD does not reduce to less than 3 mm after SRP, pocket reduction must be carried out surgically (*flap surgery or gingivectomy or gingivoplasty*).
- Periodontitis presenting with **more than 5 mm** PD and moderate/severe horizontal and/or vertical bone loss or other bone defects before initial treatment (*phase I therapy—SRP, etc.*) has to be treated by flap surgery (*includes resective or regenerative bone surgery*) or by gingivectomy (*if no bone surgery is required*) to bring PD to less than 3 mm.
If more than 3 mm PD remains few weeks after flap surgery, further pocket reduction must be done to bring PD to less than 3 mm (*by gingivectomy or gingivoplasty*).
- In general, one and two walled intrabony defects and horizontal bone loss **do not** show increase in bone height after bone grafting (*regenerative bone surgery*).

Grade IV: These are similar to grade III furcation defects but here the furcation defects are *exposed*, i.e. not covered by gingiva (*gingiva over furcation is receded and furcation is visible*). They appear as radiolucent areas in radiographs (Fig. 20.4, diags E and H).

◀ What is the difference between grade III and IV furcation involvement

ETIOLOGY OF FURCATION INVOLVEMENT

Etiopathogenesis of furcation involvement is the *same* as that of periodontitis (*because it is a progressive event in ongoing periodontitis*) (see Chapter 10, 'Plaque Induced Gingivitis and Periodontitis', page 135). Some *additional* factors that may contribute furcation involvement are:

1. Tooth fractures in the furcation area.
2. Iatrogenic causes, e.g. perforation of the pulpal floor during RCT treatment, overhanging restorations, etc.
3. Trauma from occlusion.

◀ What is the cause of furcation involvement?



CLINICAL UTILITY AND SHORT ANSWER

Which factors can affect the outcome of treatment of furcation defects (furcation involvement)?

1. **Soft tissue (gingival) anatomy:** Presence of adequate zone of attached gingiva improves prognosis and reduces rate of spread/worsening of periodontitis in the furcation.
2. **Position of tooth in the arch:** If a multirooted tooth is placed outside the arch, it increases chances of gingival recession. Such teeth are predisposed to early furcation involvement if periodontitis is present in the region (*more commonly seen on buccal side of maxillary and mandibular molars*).
3. **Root Trunk Length:** Multirooted teeth with shorter root trunks have greater chances of getting furcation involvement early. However, when such teeth do have furcation involvement, its management is easier (*due to easier access than when compared to that of teeth with longer root trunks where access to the furcation can be very difficult*).
4. **Number of roots and angle of separation between two roots of a furcation:** Greater number of roots (e.g. 3 versus 2) in a multirooted tooth reduces angle of separation between the roots, i.e. roots are more closely placed. This makes diagnosis, instrument insertion and treatment difficult due to reduced access. Prognosis of such teeth is relatively *poorer*.
5. **Anatomy of furcation's fornix area:** Furcation area of the tooth may have ridges, concavities or other defects on the tooth surface that can further restrict access and make treatment more difficult. Accessory pulpal canals opening in the furcation area can channelize products of inflammation and infection from the infected pulp of the tooth into the furcation and cause periodontal destruction. Enamel projections into the furcation areas can be present. These features make the fornix area more prone to periodontitis.

◀ How does the length of root trunk affect treatment of furcations?

◀ How does number of roots affect treatment of furcations?

◀ Which anatomical features in the fornix area of the furcation can contribute to periodontitis?

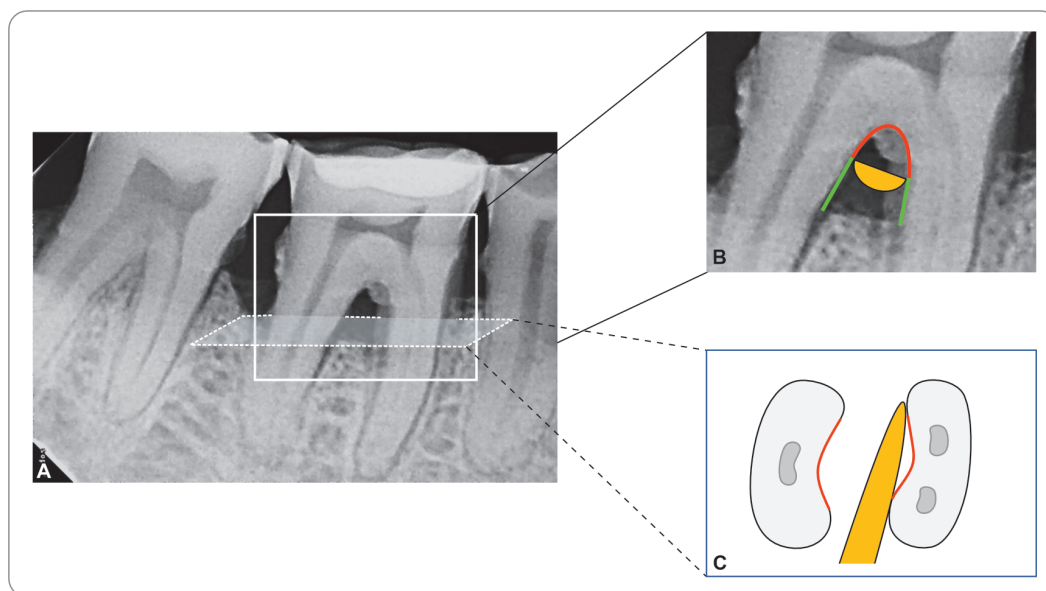


Fig. 20.5: Narrow furcations (*small angle of separation between roots*) restrict access into the furcation making it difficult or even impossible to insert a scaler or curette for scaling and root planing (*diag. B, red marked area; orange half circle: curette cross section*). Some roots making a furcation have concave surfaces (*diag. C, red marked area on cross section of roots; orange area: cross section of scaler*) which are also difficult to scale and root plane.

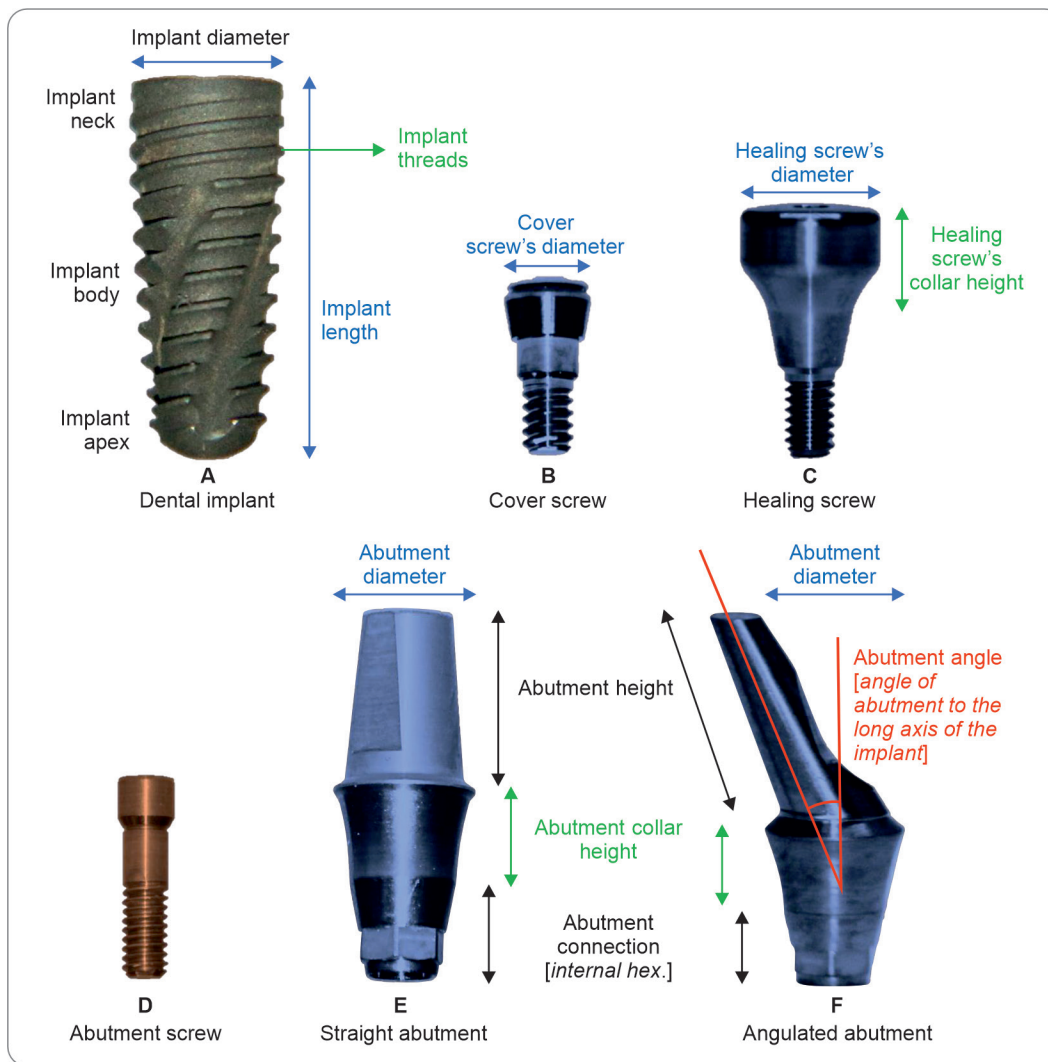


Fig. 22.1: Dental implants and other commonly used implant components

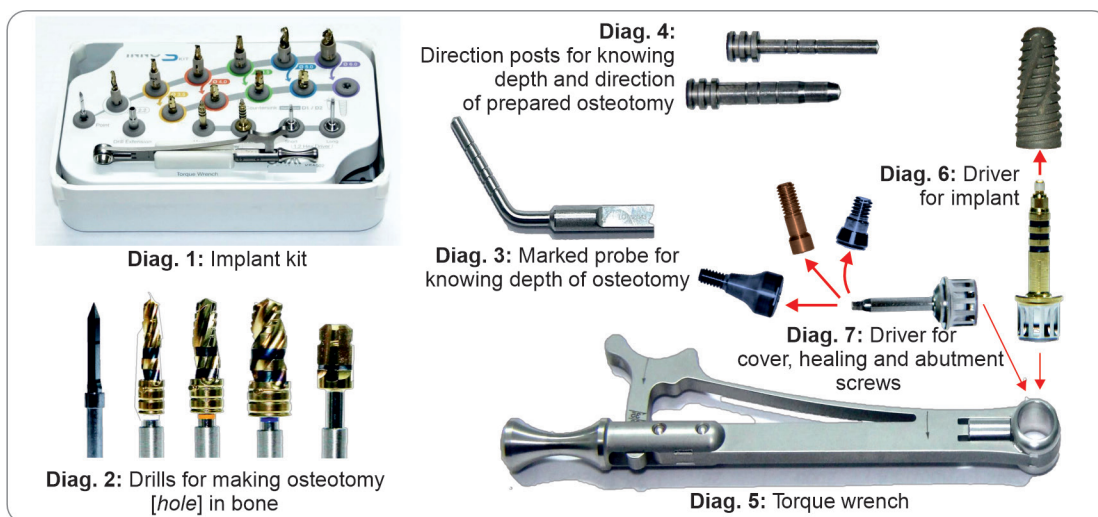


Fig. 22.2: Implant kit and its components. Implant kit (*diag. 1*); Osteotomy drills (*diag. 2*). Marked probe for ascertaining depth of prepared osteotomy (*diag. 3*). Direction posts for knowing direction, parallelism and distance between two or more osteotomies (*diag. 4*). Torque wrench for providing torque for turning implants into and out of the osteotomy (*clockwise and anticlockwise*) and tightening or loosening screws (*diag. 5*). Driver for turning implants into and out of the osteotomy (*diag. 6*). Driver for tightening or loosening screws (*diag. 7*).

Textbook of Periodontology

for Undergraduate Students

contains **22** fast-paced chapters that are complete with the entire information required for an undergraduate student in dental sciences. This will also serve as an excellent handbook of periodontology for postgraduate students, teaching faculty and dental surgeons in practice.

Exclusive features

- The entire text has been written according to the latest **AAP 2018 Classification** of periodontal and peri-implant diseases and conditions.
- All chapters are self-contained and can be read in any order. Cross-referencing will direct the reader to additional relevant sections in the book.
- Written in an informal style of writing that helps conceptual excellence in examinations and patient-management in clinics.
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- A separate column with commonly asked **viva voce questions** runs all along the text in the entire book with these questions placed precisely opposite the area of the text containing the answer.

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